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Patent

In the United States Patent and Trademark Office
Board of Patent Appeals and Interferences

In the Application of:

Vladimir Grushin et al.	Case No.: **PE0649 US DIV2**
Application No.: **10/696,349**	Group Art Unit: **2813**
Confirmation No.: **6720**	
Filed: **October 29, 2003**	Examiner: **Stephen W. Smoot**

For: **Electroluminescent Iridium Compounds with Fluorinated Phenylpyridines, Phenylpyrimidines, and Phenylquinolines and Devices Made with Such Compounds**

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Appeal Brief
37 C.F.R. § 41.37

1. Real Party in Interest

The real party in interest is E. I. du Pont de Nemours and Company, Wilmington, Delaware, the assignee of the entire right, title and interest in and to the application on appeal, as shown in an assignment from the inventors to the assignee recorded at Reel 012885, Frame 0882 on May 7, 2002.

2. Related Appeals and Interferences

There are no related appeals or interferences meeting the criteria set forth in 41 C.F.R. § 41.37(c)(1)(ii).

3. Status of Claims

Claims 12-22 are pending. Claims 1-11 have been canceled. Claims 12-22 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over the cited references. The final rejection of claims 12-22 is being appealed herein.

4. Status of Amendments

No amendment was filed subsequent to final rejection. The Amendment and Response dated September 6, 2006, containing no amendments to the claims but adding new claim 22, was entered and considered.

5. Summary of Claimed Subject Matter

Independent claims 12-17 are each drawn to a single L_3M complex where L is a bidentate 1-phenylisoquinoline ligand having fluorine, or fluorine-containing, substituents on the phenyl ring and M is iridium. Each complex conforms generally to the Fourth Formula (facial isomer) and the Fifth Formula (meridional isomer) which are set forth on page 7, lines 15-16 and 21-22 of the application specification. These in turn relate to the Third Formula, $IrL^aL^bL^c$ (page 5, lines 16-19), representing a special case where $L^a = L^b = L^c$ (page 7, line 8). See also Example 8 (though structure (XI) is identified, it should be clear that structure (XII) is applicable and was, in fact, intended. Appropriate amendment to the specification may be required.)

The general phenylisoquinoline ligand formula is shown in structure (XII), page 14, lines 1-5, and the claim 12-17 complexes conform to this structure where at least one of R_{21} through R_{30} is selected from (i) F or (ii) C_nF_{2n+1} (page 14, lines3-4). The ligands of the complexes recited in claims 12 through 17 correspond to compounds 8-1 through 8-q, respectively, in Table 8, page 15.

Independent claim 18 is drawn to an electronic device comprising an organic layer comprising at least one compound of claims 12 to 17. Please see page 18, lines 30-32.

Independent claim 19 addresses an electronic device comprising a light-emitting layer comprising at least one compound of claims 12 to 17. This claim is supported in the specification at page 18, lines 21-25 and 30-32, Table 10, page 40, Samples 11-12 through 11-16, and Table 11, page 41, Samples 11-12 through 11-16. A light-emitting layer of this type was also recited in original claim 3.

Independent claim 20 recites an electronic device comprising a charge transport layer comprising at least one compound of claims 12-17. Please see page 18, lines 30-32 and original claim 4.

Independent claim 21 is a device claim, where the device comprises an emitting layer having an emission maximum in the range of 570 nm to 700 nm and at least 20% of the emitting layer comprises at least one compound of the Third Formula (described above) where the three ligands are alike or different, and the ligand is selected from structure (XI) (2-phenylquinoline) and structure (XII) (1-phenylisoquinoline, described above).

Structure (XI) is presented on page 13, lines 17-22 of the specification. As to the Third Formula, it has been noted above that the three ligands may be the same; support for the Third Formula where the ligands may be alike or different is found on page 5, lines 18-19 with reference to page 2, line 30.

6. Grounds of Rejection to be Reviewed on Appeal

There are two grounds of rejection to be reviewed in this appeal:

I. **Whether claims 13-15 and 17-22 are unpatentable under 35 U.S.C. § 103(a) as obvious over WO 01/41512 A1 (hereafter "Thompson") in view of the article by Djurovich et al. in *Polymer Preprints* 41(1), 770-771 [2000] (hereafter "Djurovich").**

II. **Whether claims 12-22 are unpatentable under 35 U.S.C. § 103(a) as obvious over Thompson in view of the article by Dedeian et al. in *Inorganic Chemistry* 30, 1685-1687 [1991] (hereafter "Dedeian") and of WO 00/70655 A2 (hereafter "Baldo").**

7. Argument

I. Claims 13-15 and 17-22 are patentable over Thompson in view of Djurovich.

Thompson does not disclose or suggest *tris*(1-phenylisoquinoline) Ir(III) complexes of claims 13-15 and 17

Thompson discloses three distinct genera of complexes: (1) LL'L"M where each ligand species L is distinct, page 3, lines 26-27, (2) L_2MX where L and X are distinct, page 1, lines 8-9, and (3) L_3M, page 3, line 35. The "arylquinoline" ligand structure shown in Fig. 39, a phenylisoquinoline structure, is not associated with the L_3M complexes in Thompson, but only with the L_2MX complexes. The "arylquinoline" ligand structure of Fig. 39 does not appear in the examples or the claims, though 7,8-benzoquinoline appears in the Markush group for L in claim 3 (see also page 17, line 21; Fig. 3, Fig. 14 and text at page 19, lines 23-31, Fig. 16 and text at page 20, lines 1-9, Fig. 40). The instance in Fig. 3 where 7,8-

benzoquinoline appears as a ligand is a *mer*-L_3M complex. The instances in Figs. 14 and 16 are both L_2MX and L = 7,8-benzoquinoline. In Fig. 40, 7,8-benzoquinoline appears in two structures, one is LL'L"M where each L is different and the other structure is LL'MX where each L is different and both L are distinct from X. There is a single synthesis example of a meridional L_3M complex of 7,8-benzoquinoline [*mer*-$Ir(bq)_3$] at page 28, line 27 to page 29, line 3 per synthesis equation (4), page 28, line 3. None of the 7,8-benzoquinolines appear to be substituted.

The utility of specific embodiment L_2MX is taught as a component of the emitting layer of a device, page 12, lines 23-28. More specifically, the L_2MX complexes are taught to be phosphorescent, page 13, lines 9-14, or even more particularly, phosphorescent molecules whose ligands L are, taken alone, fluorescent, such as L = coumarin-6, page 13, lines 17-19. Fig. 39 identifies "arylquinolines" as suitable ligands L for L_2MX complexes, page 16, line 25 and page 17, lines 26-30. Of particular interest (page 33, lines 5-26) is the adaptability of high efficiency fluorescent ligands to phosphorescent complexes using Ir as M in the L_2MX complex model.

Accordingly, Thompson identifies "arylquinolines" (which are actually 1-phenylisoquinolines) as the ligand species L in the L_2MX complexes therein disclosed, and further shows one substituent R', R" and R'", respectively, for each ring of the phenylisoquinoline structure (Fig. 39). Thompson also discloses examples of L for L_2MX as "2-(1-naphthyl)(benzoxazole), (2-phenylbenzoxazole), (7,8-benzoquinoline), coumarin, (thienylpyridine), phenylpyridine, benzothienylpyridine, 3-methoxy-2-phenylpyridine, thienylpyridine, and tolylpyridine" and further states that in addition to these examples and those shown in Fig. 39, additional examples may be found in a textbook (page 17, lines 20-30). The three R substituents depicted in Fig. 39 are undefined, and the specification does not disclose whether substitution is optional, or whether substitution must occur on all rings, or less than all rings. Examples of L_3M complexes are shown in Fig. 3 and Fig. 7.

Applicants' claims 13-15 and 17 are compound claims and conform to the general formula L_3M where each L is the same bidentate ligand. In each of these claims, the phenyl (or aryl) ring is substituted with two fluorine atoms (claims 15 and 17) or three fluorine atoms (claims 13 and 14). The final Office Action dated November 3, 2006 from which this appeal

has been taken, does not specify any suggestion or motivation in Thompson for modifying the reference to arrive at a *tris*(1-phenylisoquinoline)Ir(III) complex from Fig. 39, and Appellant respectfully submits that there is no suggestion or motivation in the reference to do so. Rather, the Action appears to presume that since three different formulas are disclosed, any ligand disclosed anywhere in the specification may be freely substituted into any of the three formulas at random, although Thompson does not teach or suggest such free associations.

Figure 39 in Thompson is the only depiction in the entire disclosure of a 1-phenylisoquinoline ligand, and is clearly associated only with the L_2MX form (page 16, line 25; page 17, lines 17-30; and Fig. 39). The ligands shown in that figure are "other" suitable ligands for L_2MX because they are in addition to those identified on page 17, lines 20-23. Ligand types for the other metal-ligand complex forms are separately identified and separately associated with the other two formulas in the drawings and in the text, as demonstrated above.

Djurovich discloses only one *tris*-phenylpyridine complex
which is distinct from the compositions of claims 13-15 and 17

Djurovich discloses *fac*-tris[2-(4'-5'-difluorophenyl)pyridine-C'^2,N] iridium(III) as a phosphorescent emitter in a polymer blend including poly(N-vinyl carbazole) and PBD (Fig. 1). Djurovich also discloses that "[d]espite the reduced emission quantum yield of Firppy (*sic*) (the *tris*(difluorophenyl)pyridine), its increased solubility in organic solvents over that [of the unfluorinated complex] makes FIrppy a more suitable lumiphore candidate for polymer blend LEDs."

Thompson's preferred embodiments and substituents
teach against modification or combination with Djurovich

Thompson's preferred embodiment is clearly L_2MX (page 12, lines 23-28 and claims 1-13, 15, 20 and 22), and pyridines, pyridyls, and indole are the preferred L constituents, benzoquinoline as well, with acac the preferred X. See generally Examples (page 17, lines 24-25, page 18, lines 26-31, page 19, lines 1-16 and 23-31, page 20, entire, page 21, lines 1-12, Figs. 39 and 40 by way of example). Djurovich is directed exclusively to phenylpyridines (ppy) and enhanced solubility of fluorinated ppy. None of Applicants' ligands comprise ppy, and therefore it would not have been obvious to one skilled in the art to combine Djurovich with Thompson to arrive at the Applicants' ligands or the general formula L_3M, or the

specific compounds disclosed in claims12-17. Djurovich teaches only one compound, an iridium complex having three ppy ligands, substituted with fluorine ("FIrppy"). The Examiner further stated that it would have been obvious to use the fluorine of FIrppy as the substituents on the "arylquinoline" ligand of Thompson in order to improve the solubility. Applicants respectfully disagree with this assessment. The ligand of the Djurovich complex is a phenylpyridine, not a phenylquinoline or phenylisoquinoline. While Djurovich may disclose empirical evidence that fluorinating the ppy disclosed therein rendered it more soluble while reducing emission efficiency only slightly, this does not teach or suggest that fluorinating any other emissive species would have the same conjunction of useful and beneficial results. Thompson's undefined substituents "R" have no disclosed electronic effects or effects on solubility. It is also not immediately apparent what electronic effects that F substituents or F-substituted alkyl substituents (which would be electron-withdrawing groups) would have on electroluminescent properties of the new ligands, or whether they would be sufficient to enhance solubility in a desired solvent medium of a much larger ligand molecule. It is respectfully submitted that one of ordinary skill reading Djurovich would not have been led to choose fluorine as a substituent on a phenylisoquinoline ligand with the expectation of achieving identical results.

Foregoing arguments apply to device claims 18-20

Claim 18 is a device claim comprising an organic layer comprising at least one compound of claims 12-17. Claim 19 is directed to a device comprising a light-emitting layer comprising at least one compound of claims 12-17. Claim 20 addresses a device comprising a charge transport layer comprising at least one compound of claims 12-17. Appellant submits that the foregoing analysis and argument pertaining to claims 12-17 applies equally to the final rejection of claims 18-20.

Neither Thompson nor Djurovich, alone or in combination, renders claim 21 obvious

Concentration vs. quantum efficiency

The final Office Action avers that it would have been obvious to use greater than 20% by weight of the iridium complex in the light-emitting layer of Thompson in order to increase the total amount of light emitted. Appellant respectfully maintains disagreement with this conclusion. Thompson does not teach a range of concentrations for an iridium complex in a

light-emitting layer. Thompson discloses one data point: a device in which the light-emitting layer L_2MX is 12% by weight bis(2-phenylbenzothiazole)iridium acetylacetonate ("BTIr") in 4,4'-N,N'-dicarbazole-biphenyl host material (page 13, lines 9-16, page 30, lines 4-8, and claim 7). This light-emitting layer when present at 12% by mass has a quantum efficiency of 12%. The BTIr complex does not have a ligand with Appellant's structure (XI) or (XII). Djurovich teaches that devices with maximum efficiency are obtained with FIrppy concentrations in the range of 2 – 3.5 wt%. (*see* last paragraph on page 771). Again, the FIrppy complex does not have a ligand with Appellant's structure (XI) or (XII) as recited in Claim 21, nor does it have the ligand of the BTIr complex of Thompson. The Thompson and Djurovich references taken individually or collectively do not teach any concentration range for iridium complexes having a ligand with Applicants' Claims 13-15 or structure (XI) or (XII), as recited in Claim 21. Djurovich's Fig. 3, page 771, shows quantum efficiency vs current density for FIrppy in a single-layer LED with poly(N-vinylcarbazole) host material, where four different concentrations of FIrppy are plotted. Djurovich teaches that for the specific composition disclosed quantum efficiencies are greatest at emitter concentrations of 2.2% and 3.5% by weight and at current densities of 40 $mAcm^{-2}$ or less. Djurovich significantly teaches that "[t]o our knowledge" the quantum efficiency of 1.7% reached at 2 – 3.5 % weight concentrations of FIrppy "is the best achieved" for a single-layer LED based on the particular host material and dopant therein disclosed. Thompson teaches only that 12% by weight BTIr dopant in CBP host (page 13, lines 9-16) has a quantum efficiency of 12%, with no disclosure or suggestion as to how the quantum efficiency might be increased or otherwise modulated by other variables, such as current density, host material, ligand identity, and combinations of the same or different ligands, and so forth. Thompson's emitter compound is based on the formula L_2MX wherein L = 2-phenylbenzothiazole and X = acetylacetonate, ligands not present in the claims under review.

By contrast, the present application teaches at page 19, lines 1-7:

"A layer that is greater than 20% by weight iridium compound, based on the total weight of the layer, up to 100% iridium compound, can be used as the emitting layer. This is in contrast to the non-fluorinated iridium compound, tris(2-phenylpyridine) iridium (III),

which was found to achieve maximum efficiency when present in an amount of only 6 to 8% by weight in the emitting layer. This was necessary to reduce the self-quenching effect."

Accordingly, Applicants respectfully assert that the reliance on *In re Woodruff*, 16 USPQ2d 1935, 1937 (CAFC 1990) and *In re Huang*, 40 USPQ2d 1685, 1688 (CAFC 1996), is misplaced, based as it appears to be on the assumption that the concentration of the Ir metal complex alone is a result effective variable. Combining Djurovich with Thompson teaches that for any emitter complex – host combination, quantum efficiency must be empirically determined and cannot be presumed from the data presented in the prior art. The prior art teaches against any such determinations.

Ligand-metal complexes

Claim 21 is directed to a device in which three ligands, which may be alike or different, are selected from Structures XI and XII, and are bound to a metal. Structure XI is phenylquinoline, while Structure XII is phenylisoquinoline. The substituents are, generally, fluorine, fluoroalkyl, fluoroalkoxy, and difluoromethoxy or diflurohalomethoxy. There is no X ligand, as that designation is used in Thompson, in any of the claim 21 compounds. See Thompson, page 14, lines 5-9 and Fig. 1. Please see also Fig. 40, LL'MX and LMXX'. (The X ligand in Thompson's lexicography is an O-O ligand or an N-O ligand.)

For reasons set forth in detail above, Appellant submits that the complexes of claim 21 are novel and non-obvious over Thompson and Djurovich, alone or taken together.

II. Claims 12-22 are patentable over Thompson in view of Dedeian and Baldo.

Claims 12-17

Appellant's remarks pertaining to Thompson presented above are equally applicable here, and are reasserted without being repeated. Thompson teaches in the paragraph bridging pages 34 and 35, that in L_2MX complexes, the X ligand can, in some cases, affect the energy of emission and efficiency. There is no suggestion that the L ligands themselves, and/or substituents on the L ligands can be used to tune the color. There is no teaching or suggestion of substituents on the R groups for the arylquinoline structure shown in Fig. 39. Applicants respectfully traverse the Examiner's finding that Thompson discloses claimed ligands insofar

as Thompson, per the foregoing analysis, discloses the "arylquinoline" ligands as useful in L_2MX complexes and not in L_3M complexes and discloses distinct ligands in its own L_3M complexes (Figs. 3, 7) and yet further distinct ligands in LL'L"M complexes where each ligand is different (see Fig. 40).

Dedeian discloses several monosubstituted and unsubstituted phenylpyridine ligands (Table I) in an article devoted to the disclosure of a new synthetic route to the preparation of Ir(III) complexes with 2-phenylpyridines. Dedeian identifies fac tris-ortho-metalated Ir(III) complexes as strong photoreductants. There is no teaching or suggestion in Dedeian that any complex therein disclosed would be useful as a phosphorescing molecule, or that any of the complexes possess electroluminescent properties. Photoluminescent characteristics are recited, but this data does not in any way guarantee that a photoluminescent agent will also be electroluminescent. All of the Dedeian $Ir(ppy)_3$ species shown that have substituents are substituted in the 4-position except for one, methoxypyridine, which is 5-substituted. For this reason, Appellant respectfully maintain disagreement with the statement that Dedeian shows that the substituents can be placed anywhere on the ligand. It is not clear from a reading and careful examination of Dedeian whether the substituents were placed where they were to demonstrate that such variations would not affect the desired *fac* product of the synthesis. As noted earlier, the principal theme of this article is to describe a new synthetic pathway to $Ir(ppy)_3$ complexes useful as photoreductants.

Baldo is directed to L_3M complexes represented by the formula $Ir(ppy)_3$ where ppy is phenylpyridine. The ppy constituents may be substituted with alkyl or aryl or may be modified by adding a heteroatom or moving the heteroatom(s) of the aromatic structure to different positions. Therefore, even if Thompson, Dedeian and Baldo are combinable for the reasons given by the Office Action, there is no teaching or suggestion to motivate changing Thompson's L_2MX, L_3M or LL'L"M ligands and their patterns of combination to Appellant's ligands and Appellant's patterns of combination. As noted in detail above, Thompson teaches an "arylquinoline" [phenylisoquinoline] ligand only in his L_2MX complex; both Dedeian and Baldo teach L_3M complexes comprised of $Ir(ppy)_3$. Nothing in any of these references suggests that phenylisoquinoline is useful as L in L_3M or that Thompson's L in L_2MX could also be transferred to Thompson's L_3M. To the contrary, Thompson teaches different ligands

for each of L_2MX, L_3M and LL'L"M and Dedeian and Baldo teach only $Ir(ppy)_3$ for their L_3M complexes. So even if the references are combinable for the reasons given by the Examiner, the references, alone or in combination, do not render claims 12-22 obvious and therefore unpatentable.

Based on the combined teachings of Thompson, Dedeian, and Baldo, and absent Applicants' discoveries, one of ordinary skill in the art would not know to use fluoro or trifluoromethyl substituents on a phenylisoquinoline ligand and arrive at the compounds recited in Claims 12-17.

Claims 18-20

With respect to Claims 18-20, Appellant respectfully submits that electronic devices comprising the compounds of Claims 12-17 are not taught or suggested by Thompson, Dedeian, and Baldo, for all the reasons enumerated above.

Claim 21

As stated above, Thompson does not teach a range of concentrations for an iridium complex in a light-emitting layer. As presented above, any relationship between the concentration of dopant and quantum efficiency depends upon the identity of the dopant and that of the host. Reading Thompson, Dedeian and Baldo together teaches this, and Thompson and Baldo have already been discussed and analyzed in this regard. Baldo's Fig. 2 plots quantum efficiency vs current density and clearly shows that there is no direct relationship whatsoever between dopant concentration and quantum efficiency. Baldo shows varying concentrations of $Ir(ppy)_3$ dopant with CBP host material, BCP host material, and without host material. The highest quantum efficiencies are shown by the dopant with CBP host (6% dopant concentration has the highest efficiency followed by 1% followed by 12%). The next highest quantum efficiency is shown by the dopant in 100% concentration (with no host material). The lowest quantum efficiency is shown by 6% dopant in Alq_3 with BCP.

Thompson's BTIr complex does not have a ligand with Applicants' structure (XI) or (XII) as recited in Claim 21. Dedeian relates to the use of the iridium complexes as photoreducing agents and does not discuss electronic devices at all. Baldo teaches in Figure 2 that with iridium complexes having three phenylpyridine ligands, the efficiency of devices drops dramatically when the emitting layer in CBP host material has more than 6 wt% $Ir(ppy)_3$. The Thompson, Dedeian, and Baldo references taken individully or collectively do not teach any concentration range for iridium complexes having a ligand with Applicants' structure (XI) or (XII), as recited in Claim 21.

There is no suggestion in these references that combining them would lead to the Appellant's compounds and devices. Any such suggestion is conspicuously absent, given common authorship/inventorship by P.I. Djurovich in Thompson and the common inventors between Thompson and *Baldo*: M.E. Thompson, S. Lamansky, S.R. Forrest, M.E. Baldo, and P.E. Burrows. Dedeian was published about eight years before Thompson and Baldo were filed, so that the inventors had -F and $-CF_3$ as well as as $-OCH_3$ available as ppy ligand substituents but chose not to disclose or claim them in their later patent applications on either ppy or "arylquinoline". This choice on their part can be taken circumstantially to teach away from the use of such substituents on phenylisoquinoline and phenylquinoline ligands.

Dedeian is non-analogous art

Appellant submits that Dedeian, since it does not relate to electroluminescent species, is non-analogous art. Art in the same field is analogous. Art in different fields may still be applied if the prior art and the present application address the same problem, or a common problem for which functions or properties of structures of the prior art device suggest a solution. Dedeian treats synthesis of Ir complexes used as photoreducing agents, but does not seek to solve the primary problem encountered by the current inventors, the discovery of light emitting and charge transporting complexes. Dedeian does not disclose or teach electroluminescent structures or properties, and therefore, it is difficult to see the relevance of this reference to the compounds and devices set forth in the claims.

III. Appellant has not improperly attacked references individually.

Appellant does not dispute that the rejections in this case are based on a combination of two references on one hand, and three on the other.

To discuss the references meaningfully, it is necessary to ascertain, sometimes in detail, the content of each. This analysis is also necessary, essential, to analyzing the propriety of the asserted combination and motivation, as well as making a determination as to whether the combination of references put the inventor in possession of the invention. That is, to answer the question whether the inventor merely combined elements or components whose functions were known and were assumed to operate in accordance with their known

functions and results. This is all Appellant has attempted to do, and Appellant respectfully asserts that there has not been an attempt to attack the references individually at the expense of addressing the propriety of the combination and the motivation therefor. Rather, Appellant respectfully submits that the record is replete with analysis directed to both the combination and the motivation for combining and modifying them, as well as analysis of the functions and properties of the various components of the prior art and the components of the claims. As asserted previously, Appellant respectfully maintains that the combinations wre not justified.

In summary, the claims show species distinct from those shown in the references, including electroluminescent compositions not shown in Dedeian (whose eight complexes are photoluminescent and not taught to have electroluminescent properties or any brightness properties) and ligands, substituents and patterns of substitution not taught or suggested by other references. The conclusion that the references disclosed the components and that Appellant merely arranged them in a different pattern while utilizing know functions and properties of each, is not shown, and Appellant respectfully submits, has still not been established. The claimed complexes have properties that are not demonstrated to be present in the complexes disclosed in the art, and this absence has not been addressed or taken into account. It must be, since the properties of the claimed complexes are part of the invention as a whole.

Summation

Applicants respectfully submit that the final rejections should be reversed and the application remanded for allowance of claims 12-21.

Respectfully submitted,

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Date: May 7, 2007

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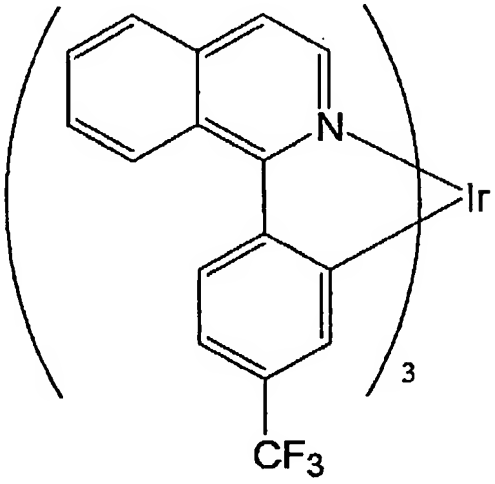
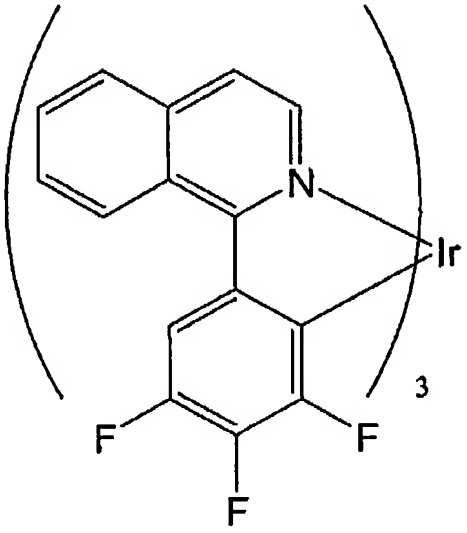
8. Claims Appendix

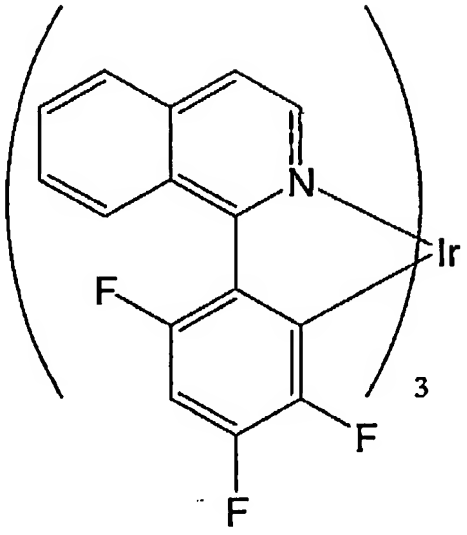
12. A compound having the formula:



13. A compound having the formula:



14. A compound having the formula:



15. A compound having the formula:

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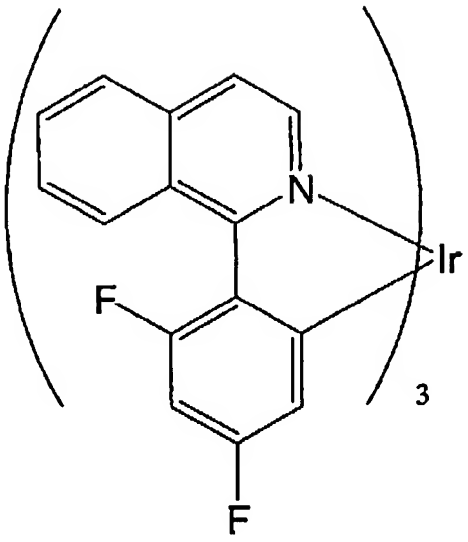
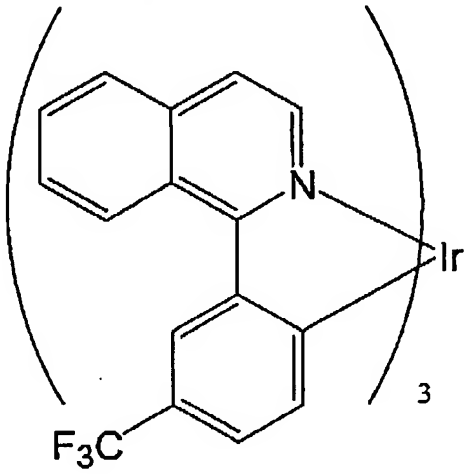
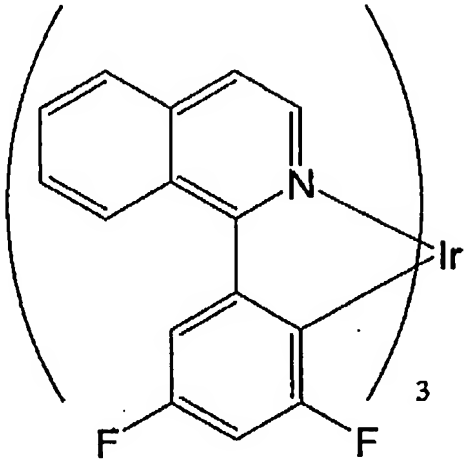


16. A compound having the formula:



17. A compound having the formula:



18. An electronic device comprising an organic layer comprising at least one compound having the formula set forth in Claims 12 to 17.

19. An electronic device comprising a light-emitting layer comprising at least one compound of Claims 12 to 17.

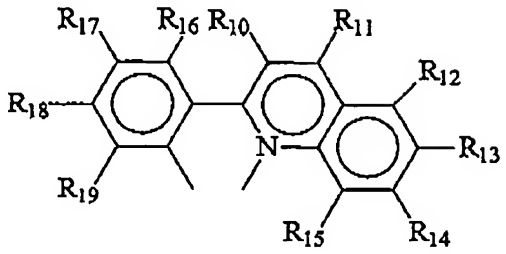
20. An electronic device comprising a charge transport layer comprising at least one compound of Claims 12 to 17.

21. An organic electronic device comprising an emitting layer having an emission maximum in the range of 570 to 700 nm, wherein at least 20% by weight of the emitting layer comprises at least one compound having a Third Formula below:

$$IrL^aL^bL^c, \qquad \text{(Third Formula)}$$

where:

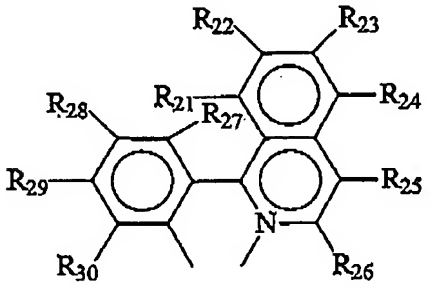
L^a, L^b, and L^c are alike or different from each other and each of L^a, L^b, and L^c has a structure selected from structure (XI) and structure (XII) below:



(XI)

wherein:

at least one of R_{10} through R_{19} is selected from F, C_nF_{2n+1}, OC_nF_{2n+1}, and OCF_2X, where n is an integer from 1 through 6 and X is H, Cl, or Br;



(XII)

wherein:

at least one of R_{21} through R_{30} is selected from F, C_nF_{2n+1}, OC_nF_{2n+1}, and OCF_2X, where n is an integer from 1 through 6 and X is H, Cl, or Br.

22. An organic electronic device of Claim 21 wherein $L^a = L^b = L^c$.

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9. Evidence Appendix.

None.

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10. Related Proceedings Appendix.

None.